AC/DC Medical Power Supply

- High power density power supply (encapsulated)
- Certification according to IEC/EN/ES 60601-1-2 4th edition for 2xMOPP
- Low leakage current <75 µA rated for BF applications
- EMC compliance to IEC 60601-1-2 4th edition
- Risk management process according to ISO 14971 incl. risk management file
- Acceptance criteria for electronic assemblies acc. to IPC-A-610 Level 3
- Protection class II
- Operating up to 5000 m altitude
- Ready to meet ErP directive, no load power consumption <75 mW
- 5-year product warranty

The TPP 15-J AC/DC power supplies feature a reinforced double I/O isolation system according to medical safety standards IEC/EN/ES 60601-1-3rd edition for 2xMOPP approved for an operating altitude of 5000 m. The earth leakage current is below 75 µA which makes the units suitable for BF (body floating) applications. The excellent efficiency of up to 88.5% offers a high power density in the packaging format 1.1” x 2.8”. The full load operating temperature range covers −40°C to +70°C while it goes up to 85°C with 50% load derating. The units operate in compliance to the medical EMC emission and immunity levels according to latest standard IEC 60601-1-2 4th edition.

**Models**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TPP 15-103-J</td>
<td>13.2 W</td>
<td>3.3 VDC</td>
<td>4'000 mA</td>
<td>84 %</td>
</tr>
<tr>
<td>TPP 15-105-J</td>
<td>15 W</td>
<td>5 VDC</td>
<td>3'000 mA</td>
<td>86 %</td>
</tr>
<tr>
<td>TPP 15-109-J</td>
<td>15 W</td>
<td>9 VDC</td>
<td>1'670 mA</td>
<td>86 %</td>
</tr>
<tr>
<td>TPP 15-112-J</td>
<td>15 W</td>
<td>12 VDC</td>
<td>1'250 mA</td>
<td>87 %</td>
</tr>
<tr>
<td>TPP 15-115-J</td>
<td>15 W</td>
<td>15 VDC</td>
<td>1'000 mA</td>
<td>87 %</td>
</tr>
<tr>
<td>TPP 15-124-J</td>
<td>15 W</td>
<td>24 VDC</td>
<td>625 mA</td>
<td>88 %</td>
</tr>
<tr>
<td>TPP 15-136-J</td>
<td>15 W</td>
<td>36 VDC</td>
<td>417 mA</td>
<td>88 %</td>
</tr>
<tr>
<td>TPP 15-148-J</td>
<td>15 W</td>
<td>48 VDC</td>
<td>313 mA</td>
<td>89 %</td>
</tr>
</tbody>
</table>
### Input Specifications

**Input Voltage**  
- AC Range  
  Operational Range: 85 - 264 VAC (Full Range)  
  Rated Range: 100 - 240 VAC (Full Range)  
- DC Range  
  Operational Range: 120 - 370 VDC (Designed for, no certification)  
  Polarity: +DC: L / −DC: N

**Input Frequency**  
Operational Range: 47 - 440 Hz  
Certified: 50/60 Hz

**Input Current**  
- Full Load & Vin = 230 VAC  
  300 mA max.  
- Full Load & Vin = 115 VAC  
  450 mA max.

**Power Consumption**  
- No load & Vin = 230 VAC  
  75 mW max. (Ready to meet ErP directive)  
- No load & Vin = 115 VAC  
  75 mW max.

**Input Inrush Current**  
- At 230 VAC  
  40 A max.  
- At 115 VAC  
  25 A max.

**Input Protection**  
T 1.6 A / 250 VAC (Internal Fuse)

**Recommended Input Fuse**  
(The need of an external fuse has to be assessed in the final application)

### Output Specifications

**Voltage Set Accuracy**  
±1% max.

**Regulation**  
- Input Variation (Vmin - Vmax)  
  0.2% max.  
- Load Variation (0 - 100%)  
  0.7% max. (3.3 and 5 VDC model)  
  0.5% max. (other output models)

**Ripple and Noise**  
(20 MHz Bandwidth)  
- 3.3 VDC model: 40 mVp-p typ. (w/ 10 µF X5R)  
- 5 VDC model: 40 mVp-p typ. (w/ 10 µF X5R)  
- 9 VDC model: 70 mVp-p typ. (w/ 10 µF X5R)  
- 12 VDC model: 70 mVp-p typ. (w/ 10 µF X5R)  
- 15 VDC model: 70 mVp-p typ. (w/ 10 µF X5R)  
- 24 VDC model: 100 mVp-p typ. (w/ 10 µF X5R)  
- 36 VDC model: 100 mVp-p typ. (w/ 10 µF X5R)  
- 48 VDC model: 140 mVp-p typ. (w/ 1 µF X7R)

**Capacitive Load**  
- 3.3 VDC model: 6'000 µF max.  
- 5 VDC model: 4'000 µF max.  
- 9 VDC model: 1'860 µF max.  
- 12 VDC model: 1'200 µF max.  
- 15 VDC model: 820 µF max.  
- 24 VDC model: 470 µF max.  
- 36 VDC model: 220 µF max.  
- 48 VDC model: 150 µF max.

**Minimum Load**  
Not required

**Temperature Coefficient**  
±0.02 %/K max.

**Hold-up Time**  
- At 115 VAC  
  8 ms min.

**Start-up Time**  
- At 230 VAC  
  500 ms max.

**Short Circuit Protection**  
Continuous, Automatic recovery

**Output Current Limitation**  
120 - 200% of Iout max.  
145% typ. of Iout max.

**Overvoltage Protection**  
125 - 140% of Vout nom.

**Transient Response**  
- Response Deviation  
  8% max. (75% to 100% Load Step)  
- Response Time  
  500 µs typ. (75% to 100% Load Step)

All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.
### Safety Specifications

<table>
<thead>
<tr>
<th>Safety Standards</th>
<th>EN 62368-1</th>
<th>IEC 62368-1</th>
<th>UL 62368-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT / Multimedia Equipment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household</td>
<td>EN 60335-1</td>
<td>IEC 60335-1</td>
<td></td>
</tr>
<tr>
<td>Medical Equipment</td>
<td>EN 60601-1</td>
<td>IEC 60601-1</td>
<td></td>
</tr>
<tr>
<td>- Power Transformers</td>
<td>ANSI/AAMI ES 60601-1</td>
<td>IEC 61558-1</td>
<td>IEC 61558-2-16</td>
</tr>
</tbody>
</table>

- Certification Documents: [www.tracopower.com/overview/tpp15-j](http://www.tracopower.com/overview/tpp15-j)

### Protection Class
- Class I & II: [Prepared]: Reinforced Insulation

### Pollution Degree
- PD 2

### Over Voltage Category
- OVC II

### EMC Specifications

#### EMI Emissions
- Conducted Emissions
  - EN 60601-1-2 edition 4 (Medical Devices)
  - EN 55011 class B (internal filter)
  - EN 55014-1 (internal filter)
  - EN 55032 class B (internal filter)
  - FCC Part 15 class B (internal filter)
  - FCC Part 18 class B (internal filter)

- Radiated Emissions
  - EN 55011 class B (internal filter)
  - EN 55014-1 (internal filter)
  - EN 55032 class B (internal filter)
  - FCC Part 15 class B (internal filter)
  - FCC Part 18 class B (internal filter)

- Harmonic Current Emissions
- Voltage Fluctuations & Flicker
  - EN 61000-3-2, class A
  - EN 61000-3-3

#### EMS Immunity
- Electrostatic Discharge
  - Air: EN 61000-4-2, ±15 kV, perf. criteria A
  - Contact: EN 61000-4-2, ±8 kV, perf. criteria A

- RF Electromagnetic Field
- EFT (Burst) / Surge
  - L to L: EN 61000-4-5, ±1 kV, perf. criteria A
  - Continuous: EN 61000-4-6, 20 Vrms, perf. criteria A

- Conducted RF Disturbances
- PF Magnetic Field
- Voltage Dips & Interruptions
  - 230 VAC / 50 Hz: EN 61000-4-11
    - 30%, 25 periods, perf. criteria A
    - 60%, 1 period, perf. criteria A
    - >95%, 1 period, perf. criteria A
    - >95%, 250 periods, perf. criteria A
  - 115 VAC / 60 Hz: EN 61000-4-11
    - 30%, 25 periods, perf. criteria A
    - 60%, 1 period, perf. criteria A
    - >95%, 1 period, perf. criteria A
    - >95%, 250 periods, perf. criteria A

### General Specifications

<table>
<thead>
<tr>
<th>Relative Humidity</th>
<th>95% max. (non-condensing)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature Ranges</td>
<td></td>
</tr>
<tr>
<td>- Operating Temperature</td>
<td>-40°C to +85°C</td>
</tr>
<tr>
<td>- Storage Temperature</td>
<td>-40°C to +85°C</td>
</tr>
</tbody>
</table>

All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.

[www.tracopower.com](http://www.tracopower.com) September 20, 2022
### TPP 15-J Series, 15 Watt

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Derating</td>
<td>- High Temperature 4 %/V below 90 VAC</td>
</tr>
<tr>
<td></td>
<td>- Low Input Voltage 4 %/V below 90 VAC</td>
</tr>
<tr>
<td>Cooling System</td>
<td>Natural convection (20 LFM)</td>
</tr>
<tr>
<td>Altitude During Operation</td>
<td>5'000 m max.</td>
</tr>
<tr>
<td>Switching Frequency</td>
<td>75 - 95 kHz (PWM)</td>
</tr>
<tr>
<td>Insulation System</td>
<td>Reinforced Insulation</td>
</tr>
<tr>
<td>Working Voltage (rated)</td>
<td>250 VAC</td>
</tr>
<tr>
<td>Isolation Test Voltage</td>
<td>- Input to Output, 60 s 4'000 VAC</td>
</tr>
<tr>
<td></td>
<td>- Input to Case or PE, 60 s 1'500 VAC</td>
</tr>
<tr>
<td></td>
<td>- Output to Case or PE, 60 s 1'500 VAC</td>
</tr>
<tr>
<td>Creepage</td>
<td>8 mm min.</td>
</tr>
<tr>
<td>Clearance</td>
<td>8 mm min.</td>
</tr>
<tr>
<td>Isolation Resistance</td>
<td>100 MΩ min.</td>
</tr>
<tr>
<td>Leakage Current (at 264 VAC)</td>
<td>75 µA max.</td>
</tr>
<tr>
<td>Reliability</td>
<td>3'100'000 h (MIL-HDBK-217F, ground benign)</td>
</tr>
<tr>
<td>Environment</td>
<td>- Vibration</td>
</tr>
<tr>
<td></td>
<td>IEC 60068-2-6</td>
</tr>
<tr>
<td></td>
<td>- Mechanical Shock</td>
</tr>
<tr>
<td></td>
<td>IEC 60068-2-27</td>
</tr>
<tr>
<td>Potting Material</td>
<td>Silicone (UL 94 V-0 rated)</td>
</tr>
<tr>
<td>Housing Type</td>
<td>Plastic Case</td>
</tr>
<tr>
<td>Mounting Type</td>
<td>Chassis Mount</td>
</tr>
<tr>
<td>Connection Type</td>
<td>Pin Connector</td>
</tr>
<tr>
<td>Weight</td>
<td>48 g</td>
</tr>
<tr>
<td>Environmental Compliance</td>
<td><a href="http://www.tracopower.com/info/reach-declaration.pdf">www.tracopower.com/info/reach-declaration.pdf</a></td>
</tr>
<tr>
<td></td>
<td>REACH SVHC list compliant</td>
</tr>
<tr>
<td></td>
<td>REACH Annex XVII compliant</td>
</tr>
<tr>
<td></td>
<td><a href="http://www.tracopower.com/info/rohs-declaration.pdf">www.tracopower.com/info/rohs-declaration.pdf</a></td>
</tr>
<tr>
<td></td>
<td>Exemptions: 7a, 7c-I</td>
</tr>
<tr>
<td></td>
<td>(RoHS exemptions refer to the component concentration only, not to the overall concentration in the product (O5A rule). The SCIP number is provided on request.)</td>
</tr>
</tbody>
</table>

### Supporting Documents

- **Overview Link (for additional Documents)**: www.tracopower.com/overview/tpp15-j

All specifications valid at nominal voltage, resistive full load and +25°C after warm-up time, unless otherwise stated.
Outline Dimensions

Dimension in mm, () = inch
Tolerances:   x.x ±0.50 (±0.02)
        x.xx ±0.25 (±0.01)
71.7 (2.82) 
58.00 (2.283) 
2
1
Output 
28.9 (1.14) 
21.50 (0.846) 
Input 
1
3
Ø  3.4 
(0.13) 
Front view 
20.9 (0.82) 
Top view

Pin connectors

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Line</td>
<td>1</td>
<td>–Vout</td>
</tr>
<tr>
<td>3</td>
<td>Neutral</td>
<td>2</td>
<td>+Vout</td>
</tr>
</tbody>
</table>

Input: JST series
mates with JST crimp terminal: SVH-21T-P1.1
and terminal housing: VHR-3N

Output: JST series
mates with JST crimp terminal: SVH-21T-P1.1
and terminal housing: VHR-2N